Energy Efficiency Certificates

(White Tags™)

What Are They and How Do They Work?

December 4 , 2006

Sterling Planet

Renewable Energy

Solar. Wind. Water. Bioenergy.

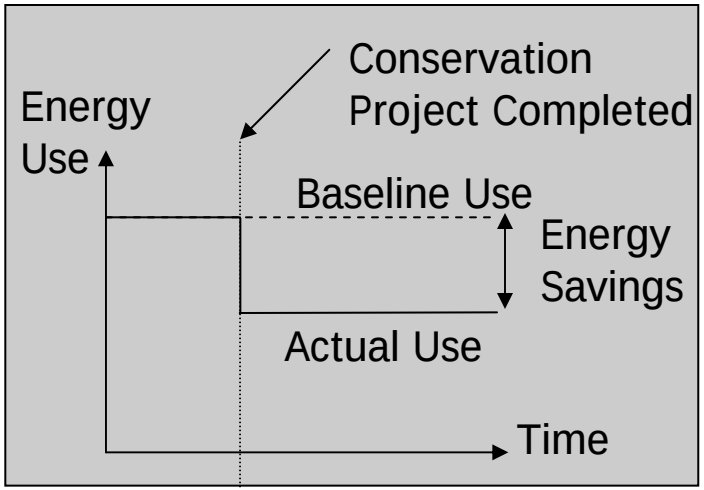
What are Energy Efficiency Certificates?

- Also known as White Tags™
- A new tradable attribute similar to Green Tags or Renewable Energy Credits (REC)
- Represents the value of energy not used (conserved) at facilities
- Created through the implementation of energy conservation projects - demand-side & CHP
- Principally electricity, but can be any energy supply

How are White Tags Created?

Implementation of energy conservation projects at a facility, including:

- Equipment upgrades, retrofits, & replacement
- Operational modifications & set point changes
- Energy management and monitoring systems
- Combined Heat and Power (CHP) or cogeneration
- New technologies (e.g. High Efficiency Lighting).



Save $

Create White Tag

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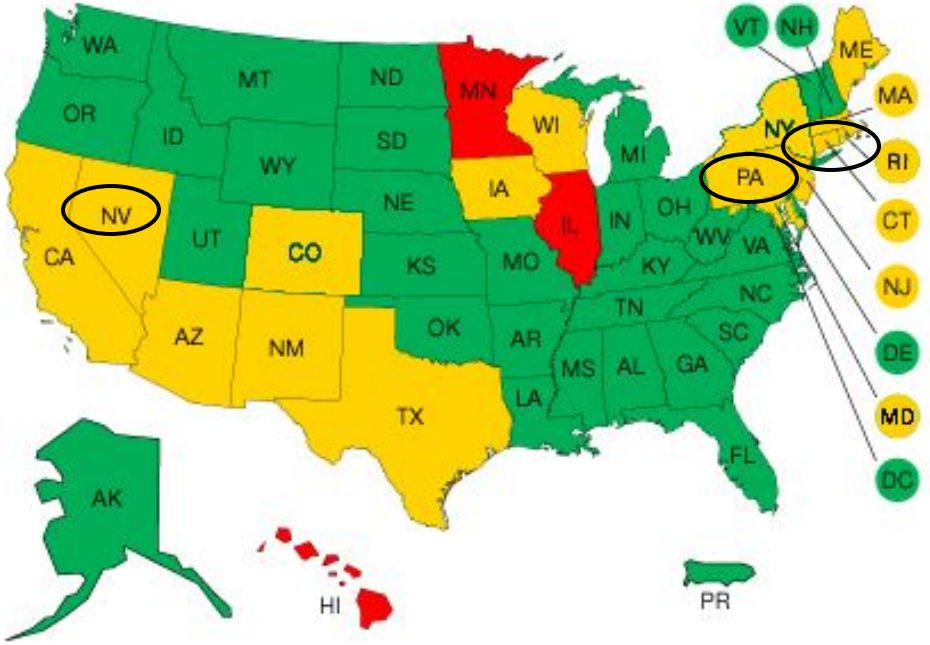
Where Are White Tags Sold?

- Implemented in Italy & France (Mandated in UK)
- Mandated in 3 US states
  - Connecticut (2007)
  - Pennsylvania (2007)
  - Nevada (2007)
  - 9 Others Evaluating Concept
- Likely in 15 other RPS states

RPS states shown in yellow & red*



- Mandates require utilities in that state to purchase White Tags - creating minimum demand, certain buyers & a price floor
- May be created in one state and sold in another (global perspective)
- May be sold to corporations & federal gov't (CO_2 reduction - not mandates)

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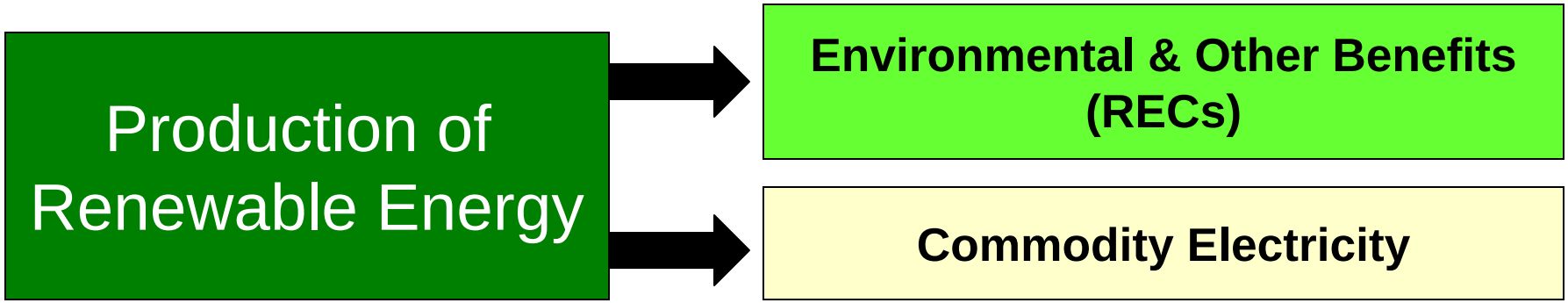
* States that have voluntary renewable energy goals or RPS-type legislation without enforcement provisions

What are Renewable Energy Certificates?

- Certificates represent the contractual right to claim the environmental and other attributes associated with electricity generated from a renewable energy facility. They are traded independently of the energy.



- Also known as RECs or Green Tags (1 MWh = 1 Tag)
- REC Purchases Mandated by State Renewable Portfolio Standards
- Retail Electricity Suppliers Must Meet a Percentage of Sales in RECs
- Suppliers Assessed Compliance Prices for Failing to Meet Percentages

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Certification

There are two leading and well recognized non-profit organizations that provide independent certification and verification of RECs:

- Environmental Resources Trust
- Green-e

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

Underwriters Laboratories Inc.®

- Establish and Enforce Protocols
- Certificate Tracking System
- Prevent Double Counting (Sale, Use or Claim)
- Coordination (States, Businesses and Institutions)

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Certification

- The key issue for White Tags is their certification through an accurate and acceptable Measurement & Verification (M&V) process
- Unlike Green Tags, which can be measured directly from metering of the renewable energy production, white tags must be determined through calculations of energy reduction from conservation projects
- These calculations require the establishment of a baseline energy use in order to compare to the actual energy use to determine the savings
- Traditionally, baseline energy use and savings have been determined by either statistical models using degree-days, which are not very accurate, or by facility models such as DOE11, which are very complicated & expensive
- With the complex dynamics of such factors as weather and the need for cost-effective application, neither type of model will be acceptable for M&V

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Measurement & Verification

White Tags™

- Prescriptive method for direct replacement/retrofit
- Metered method for cogeneration or CHP
- Design method for new buildings (LEED)
- Modeled method for operational changes (existing and new buildings)
  - Requires establishing a baseline (actual building or reference)
  - Traditionally used facility simulation models or statistical models
    - ➢ Facility: on-site, complex, expensive, subjective - but accurate
    - ➢ Statistical, off-site, simple, inexpensive, objective - but inaccurate
  - Sterling Planet has developed neural network model - best of both

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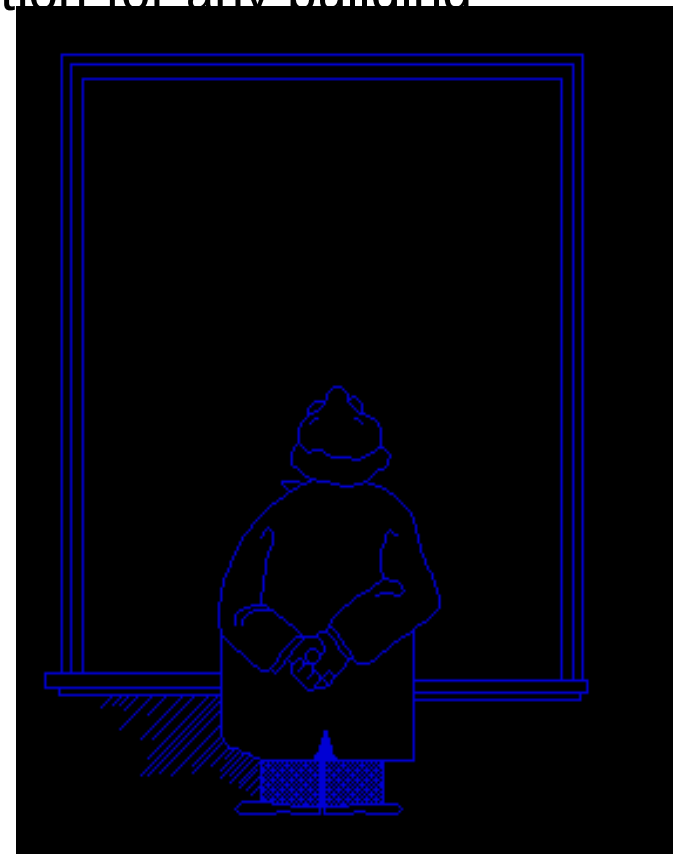
Sterling Planet's M&V Solution

- Recent advances in mathematical modeling and algorithms can be applied to energy use Measurement & Verification (M&V)
- Sterling Planet has developed energy use models using neural network technology to determine baseline energy utilization for any building
- The baseline energy use model:
  - is extremely accurate (> 99.9%)
  - is easily scalable to thousands of sites
  - is very cost-effective
  - requires no on-site energy audits
  - requires no complex facility modeling
  - requires minimal data inputs
  - determines energy savings, White Tags & GHG



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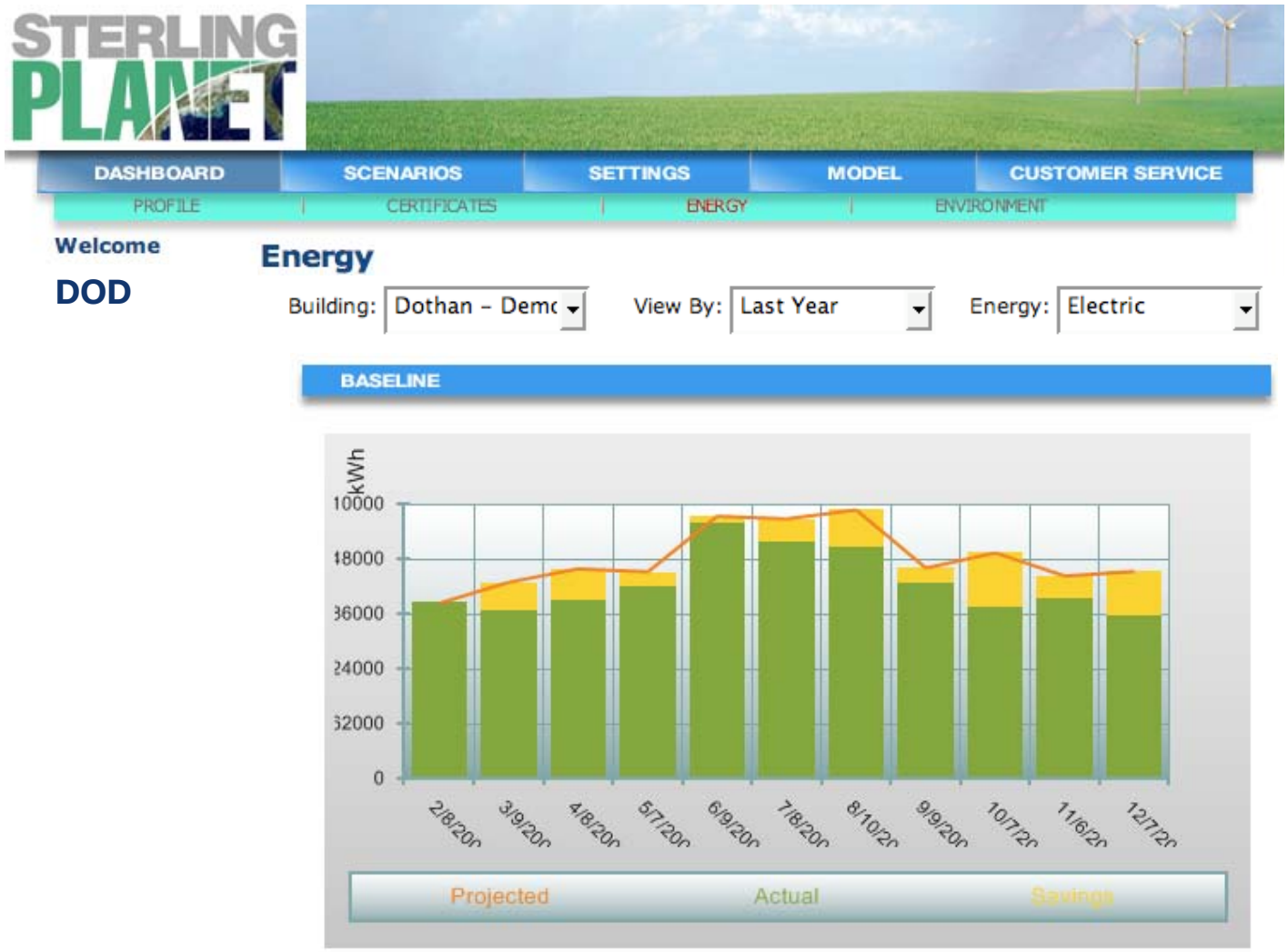
M&V: WhiteTag Pro™



- Online System
- Large Portfolio
- Baseline
- M&V
- Scenarios
- Track
  - Energy Use
  - White Tags™
  - CO2 (GHG)
  - NOx & SO2
- Database (I/O)
  - Building
  - Billing
  - Weather

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Why is this Important?

White Tags created by energy conservation projects can be certified by 4 different methods:

- Prescriptive - applicable to purchase of specific technology & assumes savings are independent of operations (with a pre-set amount and lifetime)
- Metered - applicable to installation of generation and operationally independent sub-metered loads (expensive)
- Modeled - applicable to any technology, either new installation or retrofit, as well as operational changes achieved (low cost, scalable, no time limit)
- Design - applicable to new buildings (LEED)

Create the Most White Tags

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Comparison to RECs

White Tags™

Many Ways the Same

- Mandated Market - Same States & Similar Mandates (%)
- Voluntary Market - Same rationale, but larger market share (vs mandated)
- Market Size - Similar, but likely larger with broader scope & faster adoption
- Certification - Similar, but more complex (savings vs generation)

Some Ways Different

- Regulations - Facility based, not equipment based
- Measurement & Verification (M&V) - Historically problematic

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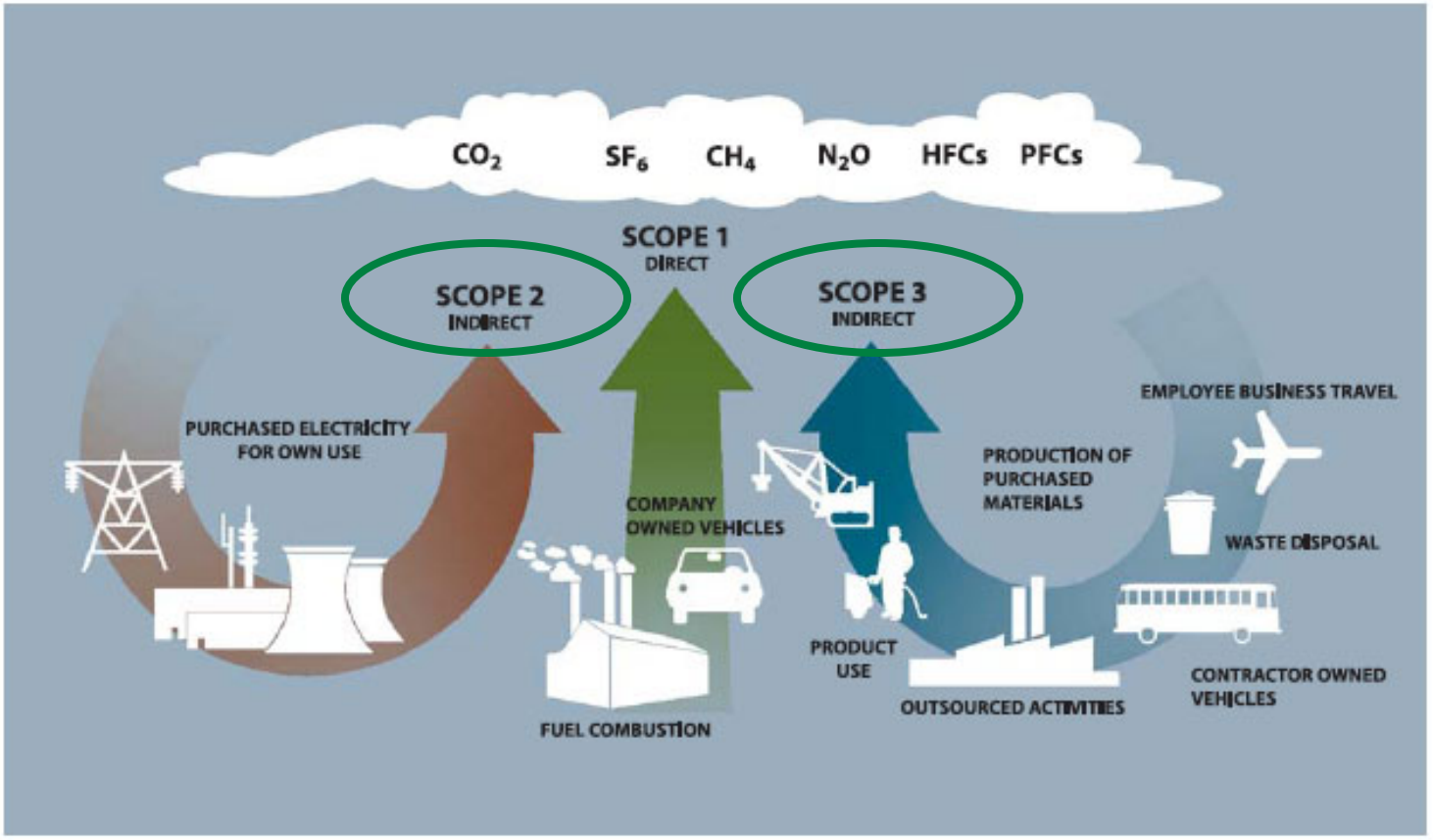
Application

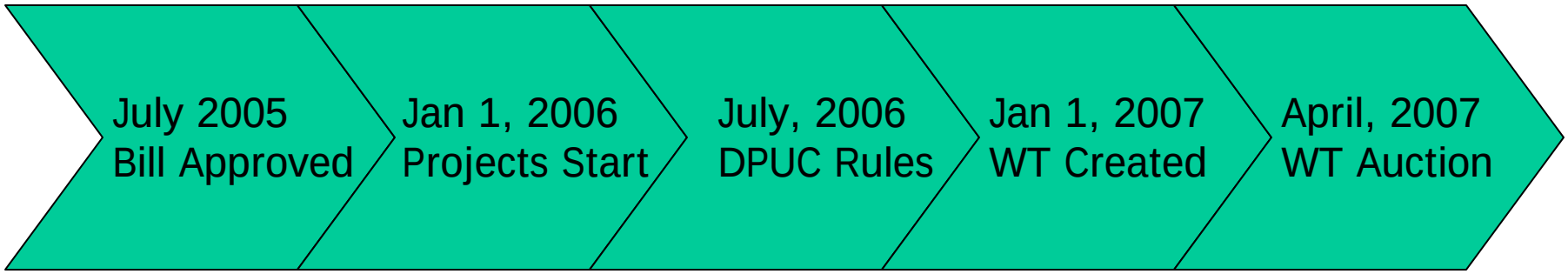
FIGURE 5 | OPERATIONAL BOUNDARIES



Source: New Zealand Business Council for Sustainable Development.

Example: Connecticut

- Amends RPS Bill - ”An Act Concerning Energy Independence”
- Adds a new “class” of requirements (Class III)
- Mandates - January 1, 2007 - 1% (for all electric suppliers & DISCOs)
  January 1, 2008 - 2%
  January 1, 2009 - 3%
  January 1, 2010 - 4%
- Directs Public Utility Commission (PUC) to construct rules
- Timeline -



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Regulations

White Tags™

- Owner of facility, not equipment, has title to the tags
- If utility funds project (e.g rebates), utility owns tags
- Demand-side projects must involve physical activity
- CHP projects must achieve 50% efficiency & 20% thermal output
- Projects completed after January 1, 2006 qualify for tags
- Mandated markets begin trading January 1, 2007
- Compliance prices in mandated markets range from 31 to 45 $/MWh
- Tags have a “vintage” and expire the year after created (+ 3 months)
- Certification requires the approval of a M&V plan

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Regulations (CT): Eligibility

Due to applicability and measurement issues, the eligibility of projects for white tags™ are delineated by customer class and project type. Five primary issues of eligibility were resolved in Connecticut.

- Title - the owner of the facility, not the owner of the equipment, has full title to the tags (exception is if utility incentives are accepted).
- Utility Funded Projects (Rebate) - facility owner has title to 0% of the tags.
- Residential - due to the difficulty and cost associated with the measurement and verification of savings, residential was excluded from initial eligibility.
- Combined Heat & Power (CHP) - or cogeneration projects are eligible for the creation of White Tags™ (electric-only).
- Grandfather Date - projects completed Jan. 1, 2006, or later are eligible.

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Regulations (CT): Measurement

Unlike Green Tags, which can be measured directly from metering of the renewable energy production, white tags™ must be determined through methods consistent with "International Performance Measurement and Verification Protocols" (IPMVP). There are 4 applicable methods :

- Prescriptive - applicable to purchase of specific technology & assumes savings are independent of operations (pre-set amount and lifetime).
- Metered - applicable to installation of generation and operationally independent sub-metered loads (expensive, required for CHP).
- Modeled - applicable to any technology, either new installation or retrofit, as well as operational changes achieved (universal).
- Design - applicable to new buildings (LEED).

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Regulations (CT): CHP

Combined Heat and Power or cogeneration that meet all permitting requirements for operation are eligible for White Tags™.

There are several unique issues with CHP.

- Efficiency- must have an operating efficiency of no less than 50%.
- Thermal output - must be at least 20% of the total energy output.
- Retrofits - incremental increase in output after Jan. 1, 2006, are eligible.
- Measurement - electric output must be metered (realistically).
- Certification - must meet efficiency requirements every quarter.

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Regulations (CT): Creation

The DPUC oversees the creation of White Tags™ through the Conservation & Load Management Administration (funds utility projects).

- Certification - projects are certified through submission of a project identification and measurement plan, while tags are certified on a one-time (proscribed) or quarterly basis (metered or modeled).
- Ownership - tags created from independently funded (non-utility) projects will be awarded 100% of the tags.
- Attributes - owner of the White Tag™ is entitled to all environmental attributes associated with the avoidance of electrical production (e.g. CO2).
- Net-to-Gross & Spill-over Factors - which address free-riders, is NOT applicable to independently funded projects.

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Regulations (CT): Disposition

Certified White Tags™ may be sold through quarterly auctions to the state's energy suppliers, direct contracts with the energy suppliers, or contracts with any interested buyer.

- Compliance Price - enacting legislation set the compliance price up to $55 per MWh. The DPUC established an initial compliance price of $ 31.
- Vintage - may be sold during the year of creation through the end of the first quarter of the next year. If not sold after that date, the tags are retired or "involuntarily" banked.
- Multi-tag Opportunities - some CHP systems, such as natural gas-fired fuel cells, qualify for both Green Tags and White Tags™.

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M&V: Modeling

- Most universal M&V method of calculating energy savings is by modeling
- These calculations require the establishment of a baseline energy use
- Traditionally, baseline energy use has been determined by:

Statistical Models (Degree-days)	Facility Simulation (DOE II)
Simple	Complex
Off-site	On-site
Inexpensive	Expensive
Objective	Subjective
Inaccurate	Accurate

- For this market, modeling needs to be scalable by being simple, requiring no on-site visits, inexpensive, objective (transparent) and very accurate

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Economics

White Tag™ Example: Pfizer

Groton, CT

- Installs 10 MW Cogeneration system
  - Capital Costs = $20 MM ($2,000 /kW)
  - Investment Tax Credit = -$2 MM (10%)
  - Depreciation* = 150% Declining Balance
  - O&M Costs ~ $4 MM (8 MBtu/MWh FCP & 5 $/MBTU)
  - Electricity Savings ~ $8 MM /year (95% CF & 10 ¢/kWh)
  - White Tag™ Sales ~ $2.5 MM /Year ($30)

- Payback
  - Without Tags = 3.25 years → With Tags = 2.25 years

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* Federal Income Tax Rate = 35%

Questions?

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